

# SC&A S. COHEN & ASSOCIATES

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January 13, 2006

Mr. David Staudt  
Center for Disease Control and Prevention  
Acquisition and Assistance Field Branch  
Post Office Box 18070  
626 Cochrans Mill Road – B-140  
Pittsburgh, PA 15236-0295

Re: Contract No. 200-2004-03805, Task Order 1: Draft *Issue Resolution Matrix Based on the SC&A Review of the NIOSH Site Profile for the Nevada Test Site*

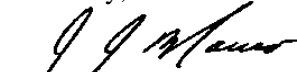
Dear Mr. Staudt:

The attached draft, entitled *Issue Resolution Matrix Based on the SC&A Review of the NIOSH Site Profile for the Nevada Test Site*, is being sent to you pursuant to the commitment SC&A made when the site profile review of the Nevada Test Site was sent to the Advisory Board and NIOSH on December 13, 2005. This issue resolution matrix follows the format of the Rocky Flats issue resolution matrix, but also includes a short list highlighting and further summarizing the issues that are most important for dose reconstruction.

As with previous reviews, the next step would be for the Advisory Board and NIOSH to review this draft matrix and provide any comments for purposes of developing a representative and clear tool for subsequent NIOSH response and issue resolution working sessions.

We appreciate this opportunity to clarify issues for resolution for the site profile review of the Nevada Test Site.

Sincerely,



John Mauro, PhD, CHP  
Project Manager

cc: P. Ziemer, PhD, Board Chairperson  
Advisory Board Members  
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## **ISSUE RESOLUTION MATRIX BASED ON THE SC&A REVIEW OF THE NIOSH SITE PROFILE FOR THE NEVADA TEST SITE**

Table 1 is a matrix showing the primary issues associated with the findings in SC&A's review of NIOSH's Site Profile for the Nevada Test Site (SCA 2005). These issues have been selected from a longer list discussed in SCA 2005 for their potential for significant impact on dose reconstruction. The issues are generally listed in the order in which they are discussed in the review. The following short bullet point list may be helpful in identifying the most critical among these for dose reconstruction:

- There are no internal dose data until late 1955 or 1956, and limited data until well into the 1960s.
- There are no data for beta dose until 1966.
- There are no neutron dose data until 1966, and only partial data until 1979.
- Data integrity of the external dose record appears to be in question until sometime in the 1960s or 1970s due to deliberate non-use of badges to avoid approaching or exceeding dose limits.
- Resuspension doses are seriously underestimated and the model is inappropriate.
- Resuspension of previously deposited radionuclides due to blast wave from an atmospheric weapons test, as well as fractionation of radionuclide deposition, need to be taken into account.
- There is no guidance for estimating dose to the GI-tract and the skin from exposure to large, non-respirable hot particles for early re-entry reactor testing and atmospheric testing workers and possibly other worker categories, such as early tunnel re-entry workers and workers exposed to accidental venting of underground tests.
- Some radionuclide lists are not complete and not oriented in sufficient detail to the time of re-entry. The Site Profile suggests the use of ORAUT-OTIB-0002 for post-1971 tunnel re-entry workers. This is inappropriate and contrary to the guidance in ORAUT-OTIB-0002.
- There are significant gaps in environmental measurement data for some years and locations, such as for external environmental dose for 1963–1966 and 1968–1976.
- The research of records and interviews of site experts are incomplete in some critical areas, such as in relation to external dose record data integrity and hot particle issues.

**Table 1: Summary of Task 1 NTS Site Profile Findings Matrix – Primary Issues**

Comment Number	TBD Number	Finding Number	Issue Number	Issue Description	SC&A Page No.	NIOSH Response	Board Action
<b>Primary Issue</b>							
1	ORAUT-TKBS-0008-2 and ORAUT-TKBS-0008-5	1	5.1	Some radionuclide lists are not complete. This is especially important for atmospheric testing and for early re-entry workers	25		
2	ORAUT-TKBS-0008-2 and ORAUT-TKBS-0008-5	2	5.2, 7.1.1	TBD does not provide adequate guidance for dose estimation to gonads, skin, and GI tract for early reactor test re-entry personnel. Large hot-particle doses to skin and GI-tract have not been evaluated. Naval Radiological Defense Laboratory documents and models have not been evaluated, though one document is referenced.	26, 79		
3	ORAUT-TKBS-0008-2 and ORAUT-TKBS-0008-5	3	5.3	Doses from large (non-respirable) particles to GI tract and skin for workers in the early atmospheric test period have not been evaluated. These doses could be high. Hot-particle doses also need to be evaluated for early drillback and other early re-entry workers during underground testing periods.	29		
4	ORAUT-TKBS-0008-5	4	5.4	Ingestion of <b>non-respirable</b> hot particles by reactor testing and nuclear weapons testing workers due to oro-nasal breathing needs to be evaluated.	30		
5	ORAUT-TKBS-0008-4	6	5.5.2	Resuspension model and resuspension factor are not scientifically defensible or claimant favorable, due to a variety of factors. Doses may be underestimated by an order of magnitude or more. Mass-loading approach would be preferable for internal dose.	31		

Comment Number	TBD Number	Finding Number	Issue Number	Issue Description	SC&A Page No.	NIOSH Response	Board Action
<b>Primary Issues</b>							
6	ORAUT-TKBS-0008-4	6	5.5.2.5	The use of the site average air concentration values when worker location is not known is not claimant favorable. Largest value consistent with job-type data should be used in such cases.	36		
7	ORAUT-TKBS-0008-4	6	5.5.2.6	Resuspension doses to monitored workers, especially early re-entry workers, may be underestimated, due to the presence of short-lived radionuclides and higher resuspension expected in the days and months after a test (including safety tests). TBD does not specify procedures for estimating environmental internal doses in such cases.	36		
8	ORAUT-TKBS-0008-4	7	5.5.3.3	Use of 1967 external dose data for 1963–1966 is not claimant favorable. There was no test in 1967 with measurable offsite fallout. Relatively short-lived radionuclides, which were likely present in 1963–1966, would have substantially decayed away by 1967.	42		
9	ORAUT-TKBS-0008-4	7	5.5.3.4	Lack of environmental external dose data for 1968–1976 is puzzling. TBD has not specified an approach to estimating external environmental dose for this period. Venting in the 1968–1970 period likely made external dose in that period (and possibly beyond) higher than 1967.	42		
10	ORAUT-TKBS-0008-4	7	5.5.3.5	The TBD does not provide any guidance for pre-1963 external environmental dose. Issues relating to unmonitored workers, as well as time of entry into contaminated areas, could be important.	42		
11	ORAUT-TKBS-0008-4	7, 13	5.5.3.6, 5.7.6	Correction factors for external environmental dose due to geometry of organ relative to badge, and angular dependence of the dose conversion factor need to be developed.	43, 71		

Comment Number	TBD Number	Finding Number	Issue Number	Issue Description	SC&A Page No.	NIOSH Response	Board Action
<b>Primary Issues</b>							
12	ORAUT-TKBS-0008-4	8	5.5.4	Radon doses in G-tunnel are not claimant favorable. Gravel Gertie radon doses are not discussed, and could be substantial. (Site status of Gravel Gertie workers needs clarification.)	44		
13	ORAUT-TKBS-0008-4	10	5.5.5	Environmental doses due to I-131 venting need to be taken into account for non-monitored workers	46		
14	ORAUT-TKBS-0008-5	12	5.6.3	There are no internal monitoring data until late 1955 or 1956; some Pu from then on; some tritium from 1958; Pu, T, and mixed fission products from 1961; and full radionuclide coverage established in about 1967. The TBD does not provide significant guidance for estimating internal dose for the pre-1967 periods for many radionuclides.	60		
15	ORAUT-TKBS-0008-5	12	5.6.3	Resuspension of radionuclides by the blast wave, fractionation of relatively non-volatile radionuclides, and the variability of Cs-137 to Sr-90 ratios need to be taken into account in internal dose estimation.	60		
16	ORAUT-TKBS-0008-5	12	5.6.3	Use of photon dose, as done by DTRA, as the basis for estimating internal dose during periods when there are no data or scattered internal monitoring data has significant uncertainties. These uncertainties are compounded by the data integrity issue associated with NTS (see comment 20 below).	60		
17	ORAUT-TKBS-0008-4 and ORAUT-TKBS-0008-5	11, 12	5.5.6 and 5.6.5	Ingestion doses need to be better evaluated.	46 and 64		
18	ORAUT-TKBS-0008-5	12	5.6.7	Recommended use of ORAUT-OTIB-0002 for post-1971 tunnel re-entry workers is contrary to guidance in that document, and its scientific validity has not been established. Its use may not be satisfactory even with restrictions, for instance for reactor testing early re-entry workers.	65		

Comment Number	TBD Number	Finding Number	Issue Number	Issue Description	SC&A Page No.	NIOSH Response	Board Action
<b>Primary Issues</b>							
19	ORAUT-TKBS-0008-6	13	5.7.2	There are no beta dose data until 1966; the TBD does not specify a procedure for estimating pre-1966 beta dose. When the approach is developed, the large, hot-particle issue will need to be taken into account.	68		
20	ORAUT-TKBS-0008-6	13	5.7.3, 7.1.1	There appears to have been intentional non-use of badges in some circumstances to avoid approaching or exceeding operational dose limits. The practice may have occurred until the mid-1960s or even extended into the 1970s. NIOSH has not investigated this problem, which raises questions on the integrity of the external dose record possibly into the 1970s, which need to be explicitly addressed.	68, 70		
21	ORAUT-TKBS-0008-6	13	5.7.5	The TBD does not contain information about extremity dosimetry. Site status of bomb assembly workers is unclear.	70		
22	ORAUT-TKBS-0008-6	13	5.7.7, 5.7.8	There are no neutron dose data until 1966, and partial data until 1979. TBD assertion that neutron doses during atmospheric testing were negligible has not been substantiated and may be in error for some workers.	72, 73		
23	ORAUT-TKBS-0008-4		5.5.2.1, 5.5.2.2, 6.1	Adequacy of soil data for estimating resuspension doses needs to be evaluated, for instance in relation to hot spot detection and Pu soil data.	31, 32, 76		
24			6.2	The presence of high-fired oxides resulting from atmospheric weapons testing and reactor testing needs to be investigated.	76		

Comment Number	TBD Number	Finding Number	Issue Number	Issue Description	SC&A Page No.	NIOSH Response	Board Action
<b>Primary Issues</b>							
25			7.1.1	NOISH documentation of site expert interviews is inadequate, and crucial site expert interviews have not been performed or performed in an incomplete manner, notably Barton Hacker and William J. Brady. Potentially critical archives and documents have not been reviewed, including the Naval Radiological Defense Laboratory and Barton Hacker primary reference materials.	79		

## References

SCA 2005, *Review of the NIOSH Site Profile for the Nevada Test Site*, SCA-TR-TASK1-0006, December 13, 2005.